

# **STATE OF NEVADA DEPARTMENT OF EDUCATION**



## **2006 - 2007 OUT-OF-SERVICE MANUAL**

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### 2006 - 2007

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#### INTRODUCTION

The purpose of the Nevada Out-of-Service Manual is to identify items on a school bus that would require the bus be placed out-of-service. The Out-of-Service manual was approved by the State Board of Education at their **October 7<sup>th</sup> & 8<sup>th</sup> 2006** meeting. The manual is effective as of that date.

The Nevada School Bus Out-of-Service Inspection Manual has utilized the *Commercial Vehicle Safety Alliance's 2005 Out-of-Service Criteria* to produce this manual. The department would also like to thank all the Nevada Highway Patrol and statewide school district transportation personnel for their assistance in developing and updating this manual.

According to NRS 392.400, the Department of Motor Vehicles and Public Safety, Nevada Highway Patrol Division, has the authority to inspect school buses in Nevada semiannually. The Nevada Highway Patrol has the authority to place any bus out-of-service for any violation listed in this manual. If the specific item is not listed in this manual, the violation is noted as a deficiency on the School Bus Inspection Form. School buses are inspected according to the Nevada State School Bus Standards, approved by the State Board of Education.

If you have questions regarding this document, please contact Diana Hollander, Program Officer, Pupil Transportation Department, Nevada Department of Education. 1820 East Sahara, Suite 205, Las Vegas, Nevada 89102. Phone number is 702-486-6626 and email address at [dhollander@doe.nv.gov](mailto:dhollander@doe.nv.gov).

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# OUT-OF-SERVICE CRITERIA

## BRAKE SYSTEMS

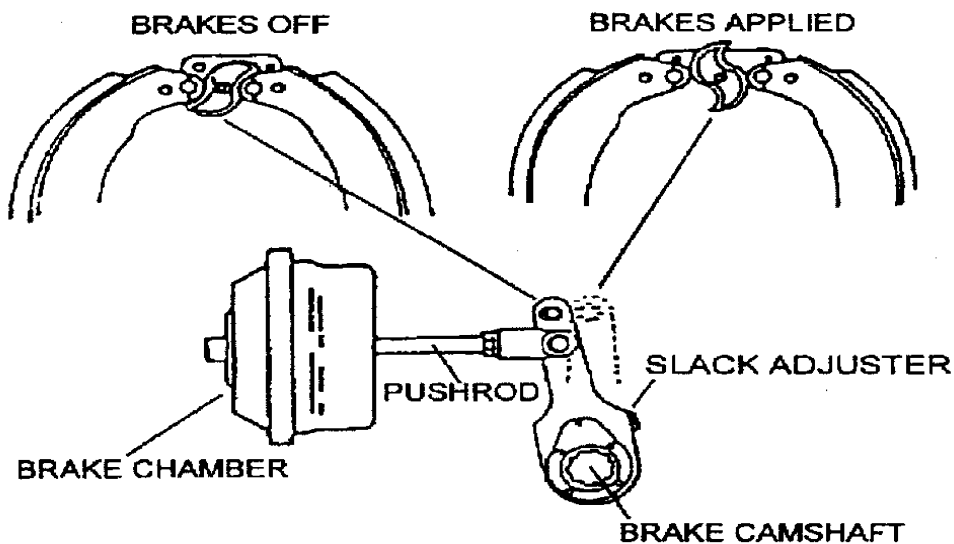
### A. DEFECTIVE BRAKES:

The number of defective brakes is equal to or greater than 20 percent of the service brakes on the vehicle. A defective brake includes any brake that meets one of the following criteria:

**NOTE:** Steering axle brakes under section C. "STEERING AXLES BRAKES" on page 10 are to be included in the 20 percent criteria.

1. Absence of effective braking action upon application of the service brakes (such as brake linings failing to move or contact braking surface upon application.) (393.48(a))
2. Missing or broken mechanical components including: shoes, linings, pads, springs, anchor pins, spiders, cam rollers, pushrods, air chamber and mounting bolts. (393.48(a))
3. Loose brake components including air chambers, spiders and camshaft support brackets. (393.48(a))
4. Audible air leak at brake chamber, (Example: ruptured diaphragm, loose chamber clamp, etc.)

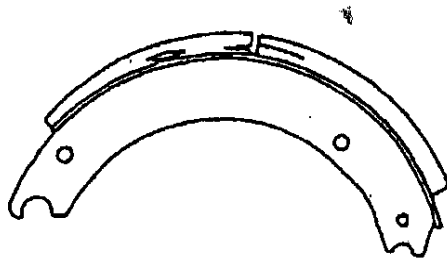
**NOTE:** Also check under section H. "AIR LOSS RATE" on page 12. (396.3(a)(1))



5. Brake adjustment limits. Bring reservoir pressure between 90 to 100 psi (620-690 KPA), turn engine off and then fully apply the brakes.
  - a. One brake at 1/4 inch (6mm) or more beyond the adjustment limit. (Example: Type 30 clamp type brake chamber pushrod measured at 2-1/4 inch (57mm) would be one defective brake.) (396.3(a)(1))
  - b. Two brakes with less than 1/4 inch (6mm) beyond the adjustment limit also equal one defective brake. Example: type 30 clamp type brake chamber pushrods measure two at 2-1/8 inches (54mm). This example would equal one defective brake. (396.3(a)(1))
  - c. Any wedge brake where the combined brake lining movement of both top and bottom shoes exceeds 1/8 inch (3mm). (396.3(a)(1))

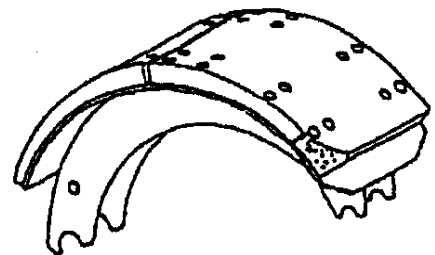
6. Brake linings or pads.

- a. Cracked, loose or missing lining.
  - (i) Lining cracks or voids of 1/16 inch (1.6mm) in width observable on the edge of the lining.
  - (ii) Portions of a lining segment missing such that a fastening device (rivet or bolt) is exposed when viewing the lining from the edge.
  - (iii) Cracks that exceed 1-1/2 inch (38mm) in length.
  - (iv) Loose lining segments. (Approximately 1/16 inch (1.6mm) or more movement.)
  - (v) Complete lining segment missing. (393.47)



**Out-of-Service**

Cracks or voids that exceed 1/16" in width  
Cracks that exceed 1 1/2 " in length



**Out-of-Service**

Portion of lining missing that exposes a fastening device.

- b. Evidence of oil seepage into or out of the brake lining/drum interface area. This must include wet contamination of the lining edge accompanied by

evidence that further contamination will occur - such as oil running from the drum or a bearing seal.

**NOTE:** Grease on the lining edge, back of shoe, or drum edge and oil stains with no evidence of fresh oil leakage are not conditions for Out-of-Service. (393.47)

- c. Air Brakes: Lining with thickness less than 1/4 inch (6mm) or to wear indicator if lining is so marked, measured at the shoe center for drum brakes or less than 1/8 inch (3mm) for disc brakes. (393.47)
- d. Hydraulic and electric brakes: Lining with thickness of 1/16 inch (1.6mm) or less at the shoe center for disc or drum brakes. (393.47)

- 7. Missing brake on any axle required to have brakes. (393.42)

## **B. BRAKE ADJUSTMENT:**

The brake adjustment shall not exceed those specifications contained hereunder relating to "Brake Adjustment Limit." Dimensions are in inches.

<b>CLAMP TYPE BRAKE CHAMBER DATA</b>		
<b>TYPE</b>	<b>OUTSIDE DIAMETER</b>	<b>BRAKE ADJUSTMENT LIMIT</b>
6	4-1/2 (114mm)	1-1/4 (32mm)
9	5-1/4 (133mm)	1-3/8 (35mm)
12	5-11/16 (145mm)	1-3/8 (35mm)
16	6-3/8 (162mm)	1-3/4 (45mm)
20	6-25/32 (172mm)	1-3/4 (45mm)
24	7-7/32 (184mm)	1-3/4 (45mm)
30	8-3/32 (206mm)	2 (51mm)
36	9 (229mm)	2-1/4 (57mm)

**NOTE:** A brake found at the adjustment limit is not a violation.



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<b>‘LONG STROKE’ CLAMP TYPE BRAKE CHAMBER DATA</b>		
<b>TYPE</b>	<b>OUTSIDE DIAMETER</b>	<b>BRAKE ADJUSTMENT LIMIT</b>
12	5-11/16 (145cm)	1-3/4 (45cm)
16	6-3/8 (162mm)	2.0 (51mm)
20	6-25/32 (172mm)	2.0 (51mm)
24	7-7/32 (184mm)	2.0 (51mm)
24*	7-7/32 (184mm)	2.5 (64mm)
30	8-3/32 (206mm)	2.5 (64mm)

\* For 3 inch maximum stroke type 24 chambers.

**NOTE:** A brake found at the adjustment limit is not a violation.

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<b>BOLT TYPE BRAKE CHAMBER DATA</b>		
<b>TYPE</b>	<b>OUTSIDE DIAMETER</b>	<b>BRAKE ADJUSTMENT LIMIT</b>
A	6-15/16 (176mm)	1-3/8 (35mm)
B	9-3/16 (234mm)	1-3/4 (45mm)
C	8-1/16 (205mm)	1-3/4 (45mm)
D	5-1/4 (133mm)	1-1/4 (32mm)
E	6-3/16 (157mm)	1-3/8 (35mm)
F	11 (279mm)	2-1/4 (57mm)
G	9-7/8 (251mm)	2 (51mm)

**NOTE:** A brake found at the adjustment limit is not a violation.

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<b>ROTOCHAMBER DATA</b>		
<b>TYPE</b>	<b>OUTSIDE DIAMETER</b>	<b>BRAKE ADJUSTMENT LIMIT</b>
9	4-9/32 (109mm)	1-1/2 (38mm)

12	4-13/16 (122mm)	1-1/2 (38mm)
16	5-13/32 (138mm)	2 (51mm)
20	5-15/16 (151mm)	2 (51mm)
24	6-13/32 (163mm)	2 (51mm)
30	7-1/16 (180mm)	2-1/4 (57mm)
36	7-5/8 (194mm)	2-3/4 (70mm)
50	8-7/8 (226mm)	3 (76mm)

**NOTE:** A brake found at the adjustment limit is not a violation.

DD-3 BRAKE CHAMBER DATA		
TYPE	OUTSIDE DIAMETER	BRAKE ADJUSTMENT LIMIT
30	8-1/8 (206mm)	2-1/4 (57mm)

**NOTE:** This chamber has three air lines and is found on motor coaches.

**NOTE:** A brake found at the adjustment limit is not a violation.

WEDGE BRAKE DATA
The combined movement of both brake shoe lining scribe marks shall not exceed 1/8 inch (3.18 mm).

**C. STEERING AXLE BRAKES:** In addition to being included in the 20 percent criterion, the following criteria places a vehicle in an Out-of-Service condition:

1. Any inoperative brake on either wheel of any steering axle of any vehicle equipped with steering axle brakes. (393.48(a))
2. Mismatch across any steering axle of:
  - a. Air chamber sizes. (396.3(a)(1))

**NOTE:** Mismatched air chamber sizes includes long stroke brake chamber versus regular stroke brake chamber.

- b. Slack adjuster length. (396.3(a)(1))

3. Brake linings or pads on the steering axle:

- a. Cracked, loose, or missing lining.
  - (i) Lining cracks or voids of 1/16 inch (1.6mm) in width observable on the edge of the lining.
  - (ii) Portions of lining segment missing such that a fastening device (rivet or bolt) is exposed when viewing the lining from the edge.
  - (iii) Cracks that exceed 1-1/2 inch (38mm) in length.
  - (iv) Loose lining segments. (Approximately 1/16 inch (1.6mm) or more movement).
  - (v) Complete lining segment missing. (393.47)
- b. Evidence of oil seepage into or out of the brake lining/drum interface area. This must include wet contamination of that lining edge accompanied by evidence further contamination will occur - such as oil running from the drum or bearing seal.

**NOTE:** Grease on the lining edge, back of shoe, or drum edge and oil stains with no evidence of fresh oil leakage are not conditions for out-of-service. (393.47)
- c. Lining with thickness less than 3/16 inch (5mm) for a shoe with a continuous strip of lining, or 1/4 inch (6mm) for a shoe with two pads for drum brakes, or to wear indicator if lining is so marked, or less than 1/8 inch (3mm) for air disc brakes, and 1/16 inch (1.6mm) or less for hydraulic disc, drum and electric brakes. (393.47)

**D. BRAKE DRUMS OR ROTORS (DISCS):**

- 1. Drums with any external crack or cracks that open upon brake application.

**NOTE:** Do not confuse short hairline heat check cracks with flexural cracks. (396.3(a)(1))
- 2. Any portion of the drum or rotor (discs) missing or in danger of falling away. (396.3(a)(1))

**E. BRAKE HOSE:**

- 1. Hose with any damage extending through the outer reinforcement ply. (Rubber impregnated fabric cover is not a reinforcement ply). (Thermoplastic nylon may have braid reinforcement or color difference between cover and inner tube. Exposure of second color is Out-of-Service.) (396.3(a)(1))
- 2. Bulge/swelling when air pressure is applied. (396.3(a)(1))

3. Hose with audible leak. (396.3(a)(1))
4. Two hoses improperly joined such as a splice made by sliding the hose ends over a piece of tubing and clamping the hose to the tube. (393.46)
5. Air hose cracked, broken, or crimped in such a manner as to restrict air flow. (393.45(a)(4))

**F. BRAKE TUBING:**

1. Tubing with an audible leak at other than a proper connection. (396.3(a)(1))
2. Tubing cracked, damaged by heat, broken, or crimped or improperly spliced/repaired in such a manner as to restrict air flow. (396.3(a)(1))

**G. LOW PRESSURE WARNING DEVICE:**

1. Low pressure warning device missing, inoperative, or does not operate at 55 psi (379KPA) and below, or 1/2 of the governor cut-out pressure, whichever is less.

**NOTE:** If either an audible or visual warning device is working, vehicle should not be placed Out-of-Service. (393.51)

**H. AIR LOSS RATE:**

1. If an air leak is discovered and the reservoir pressure is not maintained when:
  - a. Governor is cut-in;
  - b. Reservoir pressure is between 80 & 90 psi; (551-620 KPA)
  - c. Engine is at idle, and
  - d. Service brakes are fully applied. (396.3(a)(1))

**I. AIR RESERVOIR:**

1. Air reservoir security; separated from its original attachment points. (393.50)

**J. AIR COMPRESSOR:**

1. Normally to be inspected when readily visible or when conditions indicate compressor problems.
  - a. Loose compressor mounting bolts. (396.3(a)(1))

- b. Cracked, broken, or loose pulley. (396.3(a)(1))
- c. Cracked or broken mounting brackets, braces, or adapters. (396.3(a)(1))

**K. HYDRAULIC BRAKES: (Including: Power Assist over Hydraulic and Engine Driven Hydraulic Booster.)**

- 1. No pedal reserve with engine running. (396.3(a)(1))
- 2. Master cylinder less than 1/4 full.

**NOTE:** Normally to be inspected when readily visible or problems are apparent. (396.3(a)(1))

- 3. Power assist unit fails to operate. (396.3(a)(1))
- 4. Seeping or swelling brake hose(s) under application of pressure. (396.3(a)(1))
- 5. Hydraulic hose(s) abraded (chafed) through outer cover-to-fabric layer. (393.45)
- 6. Fluid lines or connections restricted, crimped, cracked, or broken. (396.3(a)(1))
- 7. Any visually observed leaking hydraulic fluid in the brake system upon full application. (396.3(a)(1))
- 8. Hydraulic System: Brake failure light or low fluid warning light on and/or inoperative. (393.51)

**L. PARKING BRAKES:**

- 1. Any inoperable parking brake;
- 2. Any non-manufactured holes or cracks in the spring brake housing section of a parking brake. 396.3(a)(1))

**M. VACUUM SYSTEM:**

- 1. Insufficient vacuum reserve to permit one full brake application after engine is shut off. (393.50)
- 2. Vacuum hose(s) or line(s) restricted, abraded (chafed) through outer cover-to-cord ply, crimped, cracked, broken, or has collapse of vacuum hose(s) when vacuum is applied. (396.3(a)(1))

## **EMERGENCY EQUIPMENT**

### **A. FIRE EXTINGUISHER:**

1. Any vehicle not equipped with at least one type 2A10BC, 5 pound pressurized, dry chemical fire extinguisher with current certification tag.

### **B. FIRST-AID KITS:**

1. Any vehicle that does not have a first aid kit **and** body fluid kit readily accessible and labeled.

### **C. WARNING DEVICES:**

1. Any vehicle not equipped with at least three reflectorized triangle road warning devices.

## **EMERGENCY EXITS**

1. All emergency doors shall be accessible by a 12 inch minimum aisle. Aisle shall be unobstructed at all times by any type of barrier, seat, wheelchair or tie down, unless a flip seat is installed and occupied. A flip seat in the unoccupied (up) position shall not obstruct the 12 inch minimum aisle to any side emergency door, must be fully operational and flip up with slight hand pressure.
2. The seat backs shall be slanted sufficiently to give aisle clearance of 15 inches at top of seat backs.
3. Any vehicle equipped with a buzzer or bell which does not operate when raised to an open position.
4. Any emergency exit equipped with a starter interlock that is non-operational.
5. Any vehicle whose emergency doors and windows are not marked according to the standards that were in effect at the time the bus was manufactured.

**NOTE:** Exterior emergency window markings were required after 11-02-92.

**NOTE:** Does not include operating instructions.

## **EXHAUST SYSTEM**

1. Any bus exhaust system leaking or discharging under the chassis more than 6 inches (152mm) forward of the rear most part of the bus when powered by a gasoline engine, or more than 15 inches (381mm) forward of the rear most part of the bus when

powered by other than a gasoline engine. (393.83)(d))

**NOTE:** Engine must be running to verify exhaust leaks.

2. No part of the exhaust system of any motor vehicle shall be so located as to be likely to result in burning, charring, or damaging the electrical wiring, the fuel supply, or any combustible part of the motor vehicle. (393.83(a))

## **FRAME & BODY**

### **A. CHASIS FRAME:**

1. Any cracked, loose, sagging, or broken frame siderail permitting shifting of the body onto moving parts or other condition indicating an imminent collapse of the frame. (393.20(a))
2. Bolts or bracket fasteners securing the cab or the body of the vehicle shall not be loose, broken or missing.
3. Any cracked, loose, or broken frame member adversely affecting support of functional components such as steering gear, engine, transmission, body parts, and suspension. (396.3(a)(1))
4. One and one-half inches (38mm) or longer crack in frame web which is directed toward bottom flange.
5. Any crack extending from the frame web around the radius and into the bottom flange. (393.201(a))
6. One inch (25mm) or longer crack in bottom flange. (393.201(a))

**NOTE:** Items (1) and (2) above apply to all buses, including those having unitized (monocoque) construction. Items (3) and (4) apply only to buses having a body-on-chassis design, such as most school buses.

### **B. ROOF/BODY STRUCTURE: (Applicable only to Carpenter School Buses)**

1. Any body structure area (roof bow/Carlin rail/window post) that is cracked.
2. Any body structure area (roof bow/Carlin rail/window post) that has been welded and has cracked again, or additional cracks appear in the structural area after initial welding has occurred, is permanently scrapped.
3. Any body structure area (roof bow/Carlin rail/window post) where 20% or more of the structural areas is cracked, will be scrapped.

4. Any lower Carlin rail that is cracked all the way through will be scrapped.

### **C. TIRE AND WHEEL CLEARANCE:**

1. Any condition, including loading that causes the body or frame to be in contact with a tire or any part of the wheel assemblies, at the time of inspection. (396.3(a)(1))

## **FUEL SYSTEM**

### **A. LIQUID FUELS:**

1. A fuel system with a dripping leak at any point. (393.67)
2. A fuel tank not securely attached to the vehicle.

**NOTE:** Some fuel tanks use spring or rubber bushings to permit movement. (393.6)

### **B. GASEOUS FUELS:**

Compressed Natural Gas (CNG), liquefied Petroleum Gas (LPG) and Liquefied Natural Gas (LNG)

**OCCUPATIONAL SAFETY NOTE:** Personnel must exercise extreme caution whenever checking a gaseous fuel system for leaks. Any possibility of creating sparks, static electricity, friction, etc., must be avoided as they could cause a fire or explosion.

**OCCUPATIONAL SAFETY NOTE:** Vehicles with leaking gaseous fuel systems must be parked carefully. Gases escaping from CNG and LNG systems will rise. If the vehicle is parked inside a building or under a canopy, roof or similar cover, combustible gasses can collect beneath the ceiling. Escaping LPG falls and can form a “pool” of combustible gas near the group and displace air, including oxygen. LPG and liquid LNG will flow into open drains. Combustible gases can explode when ignited by an open flame or spark.

#### **1. CNG or LPG:**

- a. Any fuel leakage from the CNG or LPG system detected by smell and verified by either a bubble test using non-ammonia, non-corrosive soap solution or a flammable gas detection meter.
- b. Any fuel leakage from the CNG or LPG system detected audibly and verified by either a bubble test using non-ammonia, non-corrosive soap solution or flammable gas detection meter.

**NOTE:** Verification is needed to ensure that the sound is not either internal to the fuel system (such as gas flowing in a pressure regulator, or pressure equalizing



between manifolded tanks) or a leak in the air brake system.

- c. Any fuel leakage from the CNG or LPG system detected visibly (evidence such as ice buildup or fuel system connections and fittings) and verified by either a bubble test using non-ammonia, non-corrosive soap solution or a flammable gas detection meter.

**NOTE:** Some brief fuel leakage or decompression may occur during refueling, causing temporary frosting of CNG or LPG fuel system parts. If the vehicle has been refueled shortly before inspection, care must be taken to distinguish these temporary frosting occurrences from actual leaks.

## 2. LNG:

**OCCUPATIONAL SAFETY NOTE:** LNG is a cryogenic material and presents a potential safety hazard due both to the extremely cold temperature of its liquid and the flammability of its vapor. Personnel inspecting such systems should exercise utmost caution, including the wearing of proper eye protection, gloves and clothing.

**NOTE:** LNG liquid and vaporized gas is odorless and undetectable by the human sense of smell. Frost buildup is not necessarily evidence of leakage. Many components of LNG fuel systems are extremely cold and will exhibit an even coat of frost produced by moisture in the surrounding air condensing and freezing on them.

- a. A cloud of water vapor coming from any component of the fuel system.

**NOTE:** It is normal, particularly in humid conditions, for water vapor to collect around many portions of a LNG fuel system.

- b. Any leak detected by a methane detection meter.
- c. Dripping liquid that boils or vaporizes in the air.

# HEADLAMPS, TAIL LAMPS, STOP LAMPS, and TURN SIGNALS

## A. WHEN LIGHTS ARE REQUIRED:

1. **Headlamps** - The bus does not have at least one head lamp operating on low beam. (393.24(b)) (393.17)
2. **Lamps on rear** - The bus does not have at least one steady burning tail lamp on the rear of the vehicle, visible from 500 feet (152m). (393.25(b))
3. Four way hazard lights do not fully operate in the front and rear.

## **B. AT ANYTIME – DAY OR NIGHT**

1. Overhead amber flashing lights do not fully operate when door is closed.
2. Overhead red flashing lights that do not fully operate when vehicle is stopped and the loading/unloading door is open.
3. Does not have at least one operative stop lamp on the rear of a vehicle.
4. Does not have operative turn signals visible on each side of the rear, visible at 500 feet (152m). (393.25(f))

## **MISCELLANEOUS**

### **A. DEFROSTERS:**

1. Any vehicle whose defrosters are not operational in inclement weather.

### **B. CROSSING CONTROL ARM:**

1. Any vehicle not equipped with a crossing control arm, or any vehicle whose crossing control arm is non-operational.

**NOTE:** Crossing control arms are not required for a school bus which is used solely to transport pupils with special needs who are individually loaded and unloaded in a manner which does not require them to walk in front of the bus.

### **C. HANDICAP LIFT:**

1. Chair lift must be operational.

**NOTE:** Only applicable when transporting special needs students who would require the use of a handicapped lift.

2. Any lift with securement straps that are missing, cut, or non-operational.
3. Any lift with a platform barrier/roll stop that is non-operational.

### **D. HANDRAILS:**

1. Any vehicle whose handrails have not been modified to ensure that hood cords, backpack straps, or belts will not become entangled.

**E. HORN:**

1. Any vehicle whose horn does not work.

**F. SEATS:**

1. Any vehicle with a seat that has been placed in the aisle.
2. Any vehicle whose seat frame is not secured.
3. Any vehicle with a barrier frame that is not secure.

**G. SEAT BELTS:**

1. When required, all seat belts and restraining devices shall be free from defects.

**H. STOP SIGNAL ARMS:**

1. Any vehicle manufactured after October 13, 1987, whose stop signal arm(s) does not fully extend either automatically or manually when activated, or does not have at least one operable warning lamp.
2. Any vehicle manufactured after October 13, 1987 and equipped with a LED light system, where at least 15% of the LED lights are inoperable.

**I. WINDOWS:**

1. Any vehicle whose windows are cracked with edges protruding on the inside of the bus.
2. Any vehicle whose windshield glass or driver side window has multiple cracks which obscure the driver's view.

**J. WINDSHIELD WIPERS:**

1. Any school bus that has an inoperative wiper, or missing or damaged parts that render it ineffective on the driver's side. (393.78)

**STEERING MECHANISM**

**A. STEERING WHEEL FREE PLAY:**

See chart below: When any of these values - inch movement or degrees - are met or

exceeded, vehicle shall be placed Out-of-Service. (393.209(b)) For power steering systems, the engine must be running.

Steering Wheel Diameter	Manual System Movement 30°	Power System Movement 45°
16" (41cm)	4 1/2" (11.5cm) (or more)	6 3/4" (17cm) (or more)
18" (46cm)	4 3/4" (12cm) (or more)	7 1/8" (18cm) (or more)
19" (48cm)	5" (13cm) (or more)	7 1/2" (19cm) (or more)
20" (51cm)	5 1/4" (13cm) (or more)	7 7/8" (20cm) (or more)
21" (53cm)	5 1/2" (14cm) (or more)	8 1/4" (21cm) (or more)
22" (56cm)	5 3/4" (15cm) (or more)	8 5/8" (22cm) (or more)

**NOTE:** For power systems, if steering wheel movement exceeds 45 degrees before steering axle tires move, proceed as follows: Rock steering wheel left to right between points of power steering valve resistance. If that motion exceeds 30 degrees (or the inch - movement values shown for manual steering) vehicle shall be placed Out-of-Service.

## **B. STEERING COLUMN:**

1. Any absence or looseness of U-bolt(s) or positioning part(s). (393.209(c))
2. Worn, faulty, or obviously repair-welded universal joint(s). (393.209(d))
3. Steering wheel not properly secured. (393.209(a))

## **C. FRONT AXLE BEAM AND ALL STEERING COMPONENTS OTHER THAN STEERING COLUMN: (Including wheel hub)**

1. Any crack(s). (396.3(a)(1))
2. Any obvious welded repair(s). (396.3(a)(1))

## **D. STEERING GEAR BOX:**

1. Any mounting bolt(s) loose or missing. (393.209(d))
2. Any crack(s) in gear box or mounting brackets. (393.209(d))
3. Any obvious welded repairs. (396.3(a)(1))

4. Any looseness of the yoke-coupling to the steering gear input shaft. (393.209(d))

**E. PITMAN ARM:**

1. Any looseness of the pitman arm on the steering gear output shaft. (393.209(d))
2. Any obvious welded repairs(s). (396.3(a)(1))

**F. POWER STEERING:**

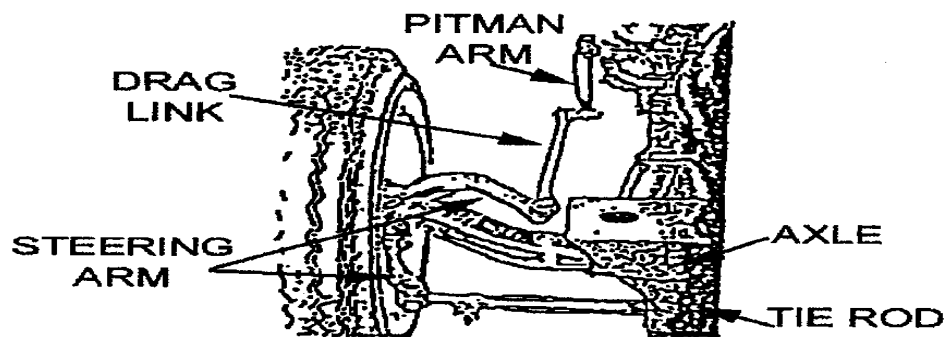
1. Auxiliary power assist cylinder loose. (393.209(e))

**G. BALL AND SOCKET JOINTS:**

1. Any movement under steering load of a stud nut. (396.3(a)(1))
2. Any motion, other than rotational, between any linkage member and its attachment point, or more than 1/8 inch (3mm) measured with hand pressure only. (396.3(a)(1))
3. Any obvious welded repair(s). (396.3(a)(1))

**H. TIE RODS AND DRAG LINKS:**

1. Loose clamp(s) or clamp bolt(s) on tie rods or drag links. (396.3(a)(1))
2. Any looseness in any threaded joint. (396.3(a)(1))



**I. NUTS:**

1. Loose or missing on tie rods, pitman arm, drag link, steering components, or tie rod arm. (396.3(a)(1))

## **J. STEERING SYSTEM:**

1. Any modification or other condition that interferes with the free movement of any steering component. (393.209(d))

## **SUSPENSION**

### **A. AXLE PARTS/MEMBERS:**

1. Any U-Bolt(s) or other spring to axle clamp bolt(s) cracked, broken, loose, or missing. (393.207(a))
2. Any spring hanger(s), or other axle positioning part(s) cracked, broken, loose, or missing resulting in shifting of a component from its normal position. (393.207(a))

**NOTE:** After a turn, lateral axle displacement is normal with some suspensions. Forward or rearward operation in a straight line will cause the axle to return to alignment.

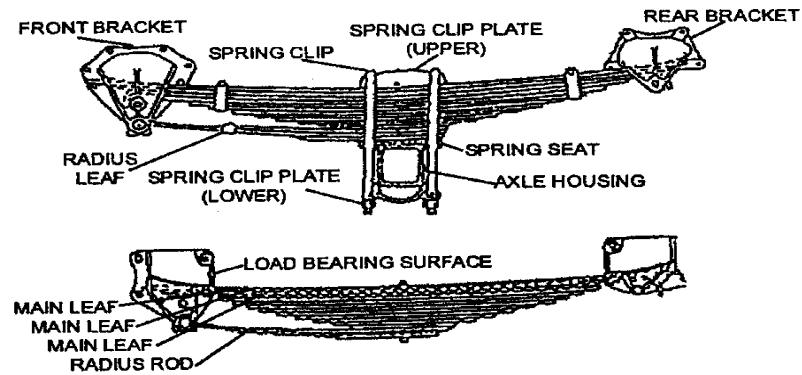
### **B. SPRING ASSEMBLY:**

1. One-fourth or more of the leaves in any spring assembly broken. (393.207(c))
2. Any leaf or portion of any leaf in any spring assembly is missing or separated. (393.207(c))
3. Any broken main leaf in a leaf spring. (393.207(c))

**NOTE:**

- a. Any leaf of leaf spring assembly is a main leaf if it extends, at both ends, to or beyond:
  - i. The load bearing surface of a spring hanger or equalizer.
  - ii. The spring end cap or insulator box mounted on the axle.
  - iii. A spring eye, further: any leaf of a helper spring assembly is a helper main leaf if it extends, at both ends, to or beyond the load bearing surface of its contact pad, hanger, or equalizer.
- b. The radius rod leaf, in springs having such a leaf, has the same function as the torque or radius components referenced in item D, "Torque, Radius, or Tracking Components," and should be treated as such a component for purposes of Out-of-Service. (393.207(c))

4. Coil spring broken. (393.207(d))
5. Rubber spring missing. (393.207(a))
6. One or more leaves displaced in a manner that could result in contact with a tire, rim, brake, drum, or frame. (393.207(c))

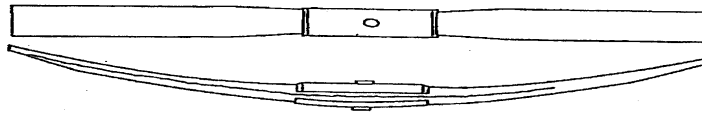


7. Broken torsion bar spring in torsion bar suspension. (393.207(e))
8. Deflated air suspension. (393.207(f))

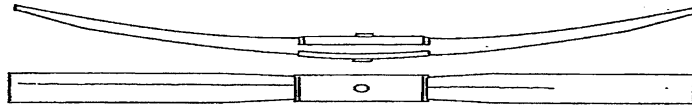
### C. COMPOSITE SPRINGS:

1. Intersecting cracks of any length. (393.207(c))
2. A crack that extends beyond  $\frac{3}{4}$  the length of the spring. (393.207(c))  
**Note:** A crack is a separation in any axis which passes completely through the spring.

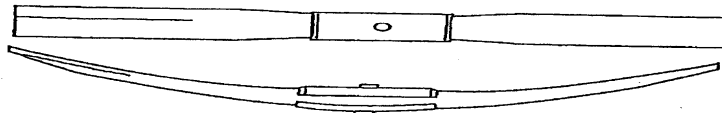
#### Out-of-Service Conditions



a) Side to side crack extending beyond 3/4 of the length of the spring. (A crack that extends beyond 3/4 the length of the spring.)



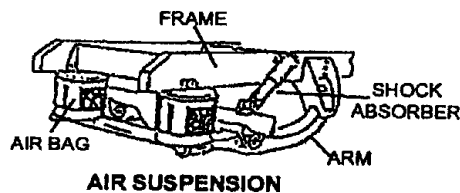
b) Top to bottom crack extending beyond 3/4 of the length of the spring. (A crack that extends beyond 3/4 the length of the spring.)



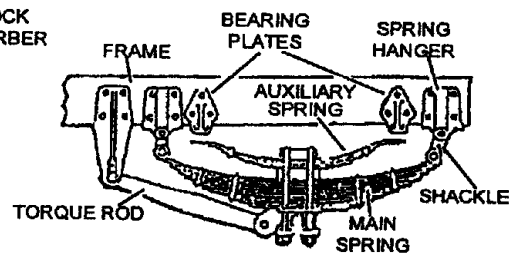
c) Intersecting cracks of any length.

#### D. TORQUE, RADIUS, OR TRACKING COMPONENTS:

1. Any part of a torque, radius, or tracking component assembly, or any part used for attaching same to the vehicle frame, or axle that is cracked, loose, broken, or missing (including spring leaves used as a radius or torque rod, missing bushings but not loose bushings in torque or track rods). (393.207(a))



AIR SUSPENSION



## TIRES

#### A. ANY TIRE ON ANY STEERING AXLE:

1. With less than 4/32 inch (1.6 mm) tread when measured in any two adjacent major tread grooves at any location on the tire. (393.75(b))
2. When any part of the breaker strip or casing ply is showing in the tread. (393.75(a))
3. When sidewall is cut, worn, or damaged to the extent the ply cord is exposed.



(393.75(a))

4. Labeled "Not For Highway Use" or carrying other markings which would exclude use on steering axles. (396.3(a)(1))
5. Visually observable bump, bulge, or knot apparently related to tread or sidewall separation. (396.3(a)(1))

**EXCEPTION:** A bulge due to a section repair is allowed not to exceed 3/8 inch (1cm) in height. This bulge may sometimes be identified by a blue triangular label in the immediate vicinity.

6. Tire is flat or has noticeable (e.g., can be heard or felt) leak. (393.75(a)(3))
7. So mounted or inflated that it comes in contact with any part of the vehicle. (396.3(a)(1))
8. Steering Axle: Weight carried exceeds tire load limit. This includes overloading tire resulting from low air pressure.
9. Any vehicle where bias and radial tires have been combined.
10. Any vehicle with recapped or retreaded tires.

**B. ALL TIRES OTHER THAN THOSE FOUND ON THE STEERING AXLE OF A POWERED VEHICLE:**

1. Tire is flat or has noticeable (e.g., can be heard or felt) leak. (393.75(a)(3))
2. Bias Ply Tire: When more than one ply is exposed in the tread area or sidewall or when the exposed area of the top ply exceeds 2 square inches (13 sq. cm). (393.75(a)(1))
3. Radial Ply Tire: When two or more plies are exposed in the tread area or damaged cords are evident in the sidewall, or when the exposed area exceeds 2 square inches (13 sq. cm.) in the sidewall. (393.75(a)(1))
4. Any tire with visually observable bump or knot apparently related to tread or sidewall separation. (396.3(a)(1))

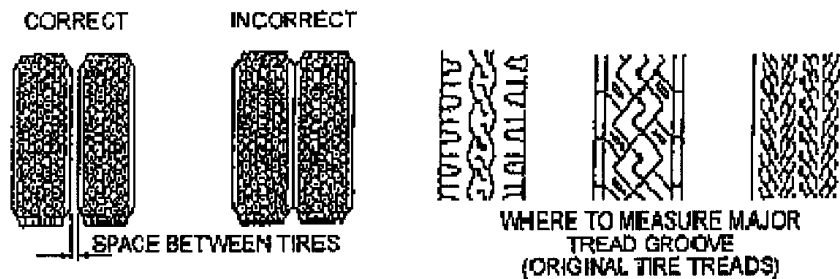
**EXCEPTION:** A bulge due to a section repair is allowed, not to exceed 3/8" (1cm) in height. The bulge may sometimes be identified by a blue triangular label in the immediate vicinity.

5. So mounted or inflated that it comes in contact with any part of the vehicle. (This includes any tire contacting its mate in a dual set.) (396.3(a)(1))

6. Weight carried exceeds tire load limit. This includes overloaded tire resulting from low air pressure.
7. Worn so that less than 2/32 inch tread remains when measured in any two adjacent major tread grooves at three separate locations on the tire. (393.75(c))

**EXCEPTION:** On dual tires, both tires must have less than 2/32 inch tread. (393.75(c)).

8. Seventy-five percent or more of the tread width loose or missing, in excess of 12 inches (30cm) in circumference. (396.3(a)(1))
9. Any vehicle where bias and radial tires have been combined.



## WHEELS, RIMS, and HUBS

### A. LOCK OR SIDE RING:

1. Bent, broken, cracked, improperly seated, sprung, or mismatched ring(s). (393.205(a))

### B. RIM CRACKS:

1. Any circumferential crack except an intentional manufactured crack at a valve stem hole. (393.205(a))

### C. DISC WHEEL CRACKS:

1. Any single crack 3 inches (76 mm) or more in length
2. A crack extending between any two holes including hand holes, stud holes and center hole.
3. Two or more cracks anyplace on the wheel. (393.205(a))

**D. STUD HOLES (DISC WHEELS):**

1. Fifty percent or more elongated stud holes (fasteners tight). (393.205(b))

**E. SPOKE WHEEL CRACKS:**

1. Two or more cracks more than 1 inch (25 mm) long across spoke or hub section. (393.205(a))
2. Two or more web areas with cracks. (393.205(a))

**F. TUBELESS DEMOUNTABLE ADAPTER CRACKS:**

1. Cracks at three or more spokes. (393.205(a))

**G. FASTENERS:**

1. Loose, missing, broken, cracked, or stripped (both spoke and disc wheels) ineffective as follows: for 10 fastener positions - 3 anywhere or 2 adjacent; for 8 fastener positions or less (including spoke wheels and hub bolts) - 2 anywhere. (393.205(a))

**H. WELDS:**

1. Any cracks in welds attaching disc wheel disc to rim. (393.205(a))
2. Any crack in welds attaching tubeless demountable rim to adapter. (393.205(a))
3. Any welded repair on aluminum wheel(s) on a steering axle. (396.3(a)(1))
4. Any welded repair other than disc to rim attachment on steel disc wheel(s) mounted on the steering axle. (396.3(a)(1))

**I. HUBS:**

1. When any axle bearing (hub) cap is missing or broken, allowing an open view into hub assembly. (396.3(a)(1) or 396.7)
2. Smoking from wheel hub assembly due to bearing failure. (396.3(a)(1))

**NOTE:** Not to be associated with smoke from dragging brake.